Experimental cognitive-linguistic assessment in Italian learners of L2 Chinese with dyslexia

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Abstract

This study develops an experimental battery to assess cognitive-linguistic skills in Italian dyslexic and non-dyslexic learners of Chinese as a second language (L2). Adapting tasks used for Chinese native children with dyslexia, the battery targets phonological awareness, Rapid Automatized Naming (RAN), orthographic awareness, working memory, morphological awareness, and literacy skills. The goal is to identify predictors of Chinese character acquisition, focusing on challenges faced by dyslexic learners. Early findings indicate how cognitive-linguistic skills interact to influence L2 Chinese acquisition. This research aims to address gaps in dyslexia and L2 Chinese acquisition, offering implications for educational strategies, particularly for dyslexic learners in multilingual contexts.

Keywords: Dyslexia, Chinese L2 Acquisition, Cognitive-Linguistic Skills, Educational Interventions

Introduction

This study investigates the cognitive-linguistic predictors of Chinese character acquisition in Italian dyslexic and typically developing learners (TDLs) of Chinese as a second language (L2). Despite extensive research on dyslexia in alphabetic languages, little attention has been paid to its manifestation in learners of non-alphabetic L2s such as Chinese. This gap is particularly critical as Chinese is increasingly being introduced as a curricular subject in Italian secondary schools (Favaloro, 2017), where tailored pedagogical frameworks and assessments are lacking (Verzì, 2023). The research uses the Hypothesis of Granularity and Transparency (HGT) (Wydell & Butterworth, 1999) as a theoretical framework, which posits that dyslexic deficits are influenced by the transparency (grapheme-phoneme regularity) and granularity (size of orthographic units) of the orthographic system. Using a custom-designed experimental battery, this study aims to identify predictors of Chinese character acquisition, compare the cognitive-linguistic profiles of dyslexic learners (Zhang et al., 2023) and TDLs, and explore how deficits manifest in Italian (a transparent, alphabetic L1) and Chinese (an opaque, morpho-syllabic L2). The main research questions are how cognitive-linguistic deficits affect Chinese L2 learners with dyslexia, whether these deficits are influenced by L1 characteristics, and whether TDLs present dyslexia-like challenges in Chinese

acquisition. Early diagnosis and intervention are crucial as dyslexia significantly affects not only cognitive skills but also social-emotional well-being (Wydell & Fern-Pollak, 2012), with unique challenges in Chinese including poor character retention, radical inversions, and confusion with visually similar characters (Siok et al., 2009).

Methodology

This study uses a quantitative testing approach, combining standardised and experimental assessments, to assess the cognitive-linguistic skills of Italian secondary school learners of Chinese as a second language (L2). Participants include dyslexic learners and typically developing learners (TDLs) recruited from language-focused high schools in northern Italy. Inclusion criteria ensured that all participants were actively learning Chinese and were at an intermediate level (B1.1-B1.2 CEFR). Exclusion criteria, such as incomplete schooling in Italy or concurrent developmental conditions, were applied to maintain homogeneity.

Experimental battery

The experimental battery includes tasks designed to assess a wide range of cognitive-linguistic skills that are critical for the acquisition of Chinese characters. These include phonological awareness, orthographic processing, morphological awareness, working memory, Chinese reading and writing fluency, Rapid Automatised Naming (RAN) and visual attention. The tasks in the experimental battery were adapted from previous research on native Chinese dyslexic learners (Pan et al., 2024; Liu et al., 2015) and L2 learners of Chinese (Chang et al., 2022; Yang, 2021). The Chinese-specific section of the battery targets key cognitive-linguistic domains. For phonological awareness, participants completed an *Onset Detection Task*, identifying the differing onset in sets of Pinyin syllables, and a *Rime Detection Task*, distinguishing the rime in other sets of Pinyin syllables. Additionally, a *Pinyin Writing Task* required participants to write Pinyin accurately, including tones, after listening to words.

Orthographic awareness and working memory were assessed using the *Chinese Orthographic Choice Task*, in which participants chose the more realistic character from two artificial options, and the *Chinese Delayed Copying Task*, where they reproduced Chinese characters from memory after a brief presentation. Morphological awareness was measured through two tasks: *Compound Word Production with Pictures*, where participants formed compound words based on images, and *Compound Word Production with Sentences*, requiring word formation after reading descriptive sentences in Italian (L1). For Chinese literacy, three tasks were included. The *Chinese Character Reading Task* assessed the ability to read high-frequency characters aloud, while the *Chinese Word Spelling Task* required participants to write characters after listening to them. Lastly, the

Chinese Word Segmentation Task involved segmenting words from a continuous chain of unspaced Chinese characters. Additionally, the test battery administered included a standardised Italian battery, the *Nuova Batteria per Studenti Universitari e Adulti LSC-SUA* (Cornoldi & Montesano, 2020), to assess participants' L1 literacy skills. This provided a baseline for understanding how deficits in Italian may affect Chinese L2 acquisition.

Data collection

Italian and Chinese tasks were administered individually in quiet school settings for accuracy. Each task was introduced with a PowerPoint presentation and practical examples, with responses recorded using standardised protocols. Oral performances were recorded with parental consent, and the OpenDyslexic font was used to enhance material accessibility (Rello, Baeza-Yates 2013).

Preliminary findings

Initial findings reveal that dyslexic learners struggle with slower reading speeds, higher error rates, and greater variability in RAN tasks, alongside difficulties in rime identification and tone accuracy in Pinyin writing. They also exhibit issues with letter order, substitution, and phoneme inversion when forming compound words. Typically developing learners perform faster with fewer errors and better rime recognition but share challenges in character order. Both groups show morphological processing difficulties, with dyslexic learners experiencing more frequent syllable/phoneme inversions or additions. These results underscore the need for targeted strategies to support dyslexic learners in Chinese character acquisition.

Discussion

This study developed an experimental battery to assess cognitive-linguistic skills in Italian dyslexic and non-dyslexic learners of Chinese as a second language (L2), focusing on phonological awareness, orthographic processing, morphological awareness, and Rapid Automatized Naming (RAN). Initial findings highlight significant challenges in rime recognition and tone accuracy among dyslexic learners, with greater performance variability compared to typically developing peers. The battery offers insights into cognitive-linguistic predictors of Chinese character acquisition and aims to bridge research gaps in dyslexia and second language acquisition, ultimately supporting tailored intervention strategies for dyslexic learners in multilingual contexts.

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References

Cornoldi, C., Montesano, E., 2020. Nuova Batteria per Studenti Universitari e Adulti LSC-SUA.

Chang, L.Y., Tseng, C.C., Perfetti, C.A., Chen, H.C., 2022. Development and validation of a Chinese pseudo-character/non-character producing system. Behavior Research Methods, 54(2), pp.632-648.

Favaloro, F.B., 2017. L'insegnamento della cultura cinese nell'istruzione secondaria. Osservazioni sullo stato dell'arte e costruzione disciplinare. In: T. Pellin, G. Trentin, eds. 2017. Atti del XV Convegno 2015. Venezia: Libreria Editrice Cafoscarina. Associazione Italiana di Studi Cinese.

Liu, D., Chen, X., Chung, K.K.H., 2015. Performance in a visual search task uniquely predicts reading abilities in third-grade Hong Kong Chinese children. Scientific Studies of Reading, 19, pp.307-324.

Pan, D.J., Meng, X., Lee, J.R., et al., 2024. Correction: The cognitive-linguistic profiles and academic performances of Chinese children with dyslexia across cultures: Beijing, Hong Kong, and Taipei. Annals of Dyslexia, 74, p.243.

Rello, L., Baeza-Yates, R., 2013. Good fonts for dyslexia. Proceedings of the 15th International ACM SIGACCESS Conference on Computers and Accessibility, 14, pp.1-8.

Siok, W.T., Niu, Z., Jin, Z., Perfetti, C.A., Tan, L.H., 2008. A structural-functional basis for dyslexia in the cortex of Chinese readers. Proceedings of the National Academy of Sciences, 105(14), pp.5561-5566.

Verzì, I., 2023. Il ruolo della consapevolezza fonologica nell'acquisizione della lettura dei caratteri cinesi in studenti sinofoni dislessici: un'analisi preliminare. In: Percorsi in Civiltà dell'Asia e dell'Africa III. Quaderni di studi dottorali alla Sapienza. pp. 153-157.

Wydell, T.N., Butterworth, B., 1999. A case study of an English-Japanese bilingual with monolingual dyslexia. Cognition, 70(3), pp.273-305.

Wydell, T.N., Fern-Pollak, L., 2012. Dyslexia - A comprehensive and international approach. BoD - Books on Demand.

Yang, Y., 2021. An analysis of word segmentation strategies in Chinese L2 learners. Journal of Chinese Linguistics, 49(1), pp.92-108.

Zhang, L., Xia, Z., Zhao, Y., Shu, H., Zhang, Y., 2023. Recent advances in Chinese developmental dyslexia. Annual Review of Linguistics, 9(1), pp.439-461.